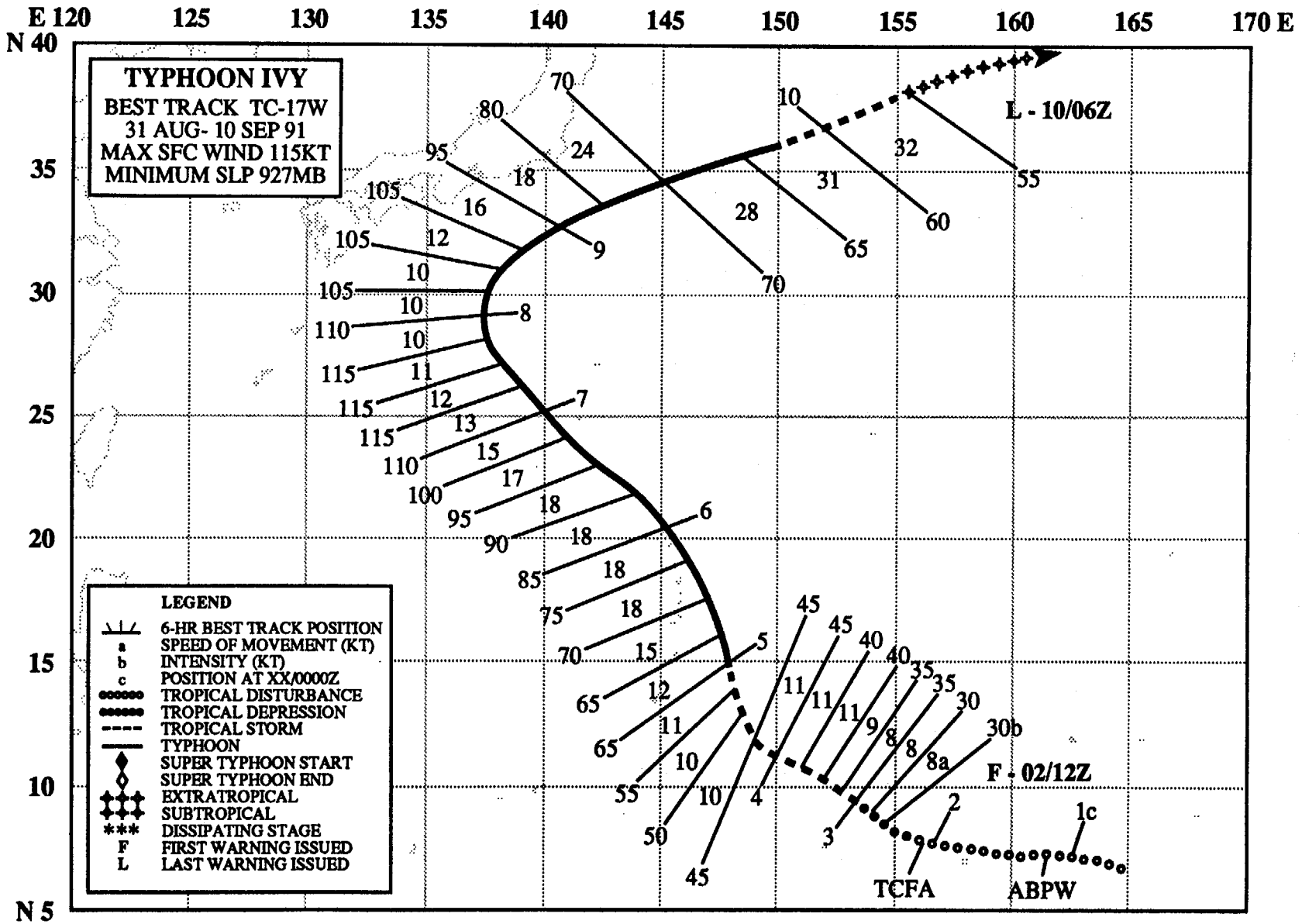
TYPHOON IVY
BEST TRACK TC-17W
31 AUG- 10 SEP 91
MAX SFC WIND 115KT
MINIMUM SLP 927MB
E 120
125
130
135
140
145
150
155
160
165
170 E
N 40
35
30
25
20
15
10
N 5
L - 10/06Z
F - 02/12Z
TCFA
ABPW
LEGEND
6-HR BEST TRACK POSITION
a SPEED OF MOVEMENT (KT)
b INTENSITY (KT)
c POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
SUBTROPICAL
*** DISSIPATING STAGE
F FIRST WARNING ISSUED
L LAST WARNING ISSUED

TYPHOON IVY (17W)

I. HIGHLIGHTS

Ivy was the first tropical cyclone to form in the monsoon trough which established itself eastward through the Caroline Islands. Ivy was also the first significant threat of the typhoon season to the Mariana Islands. For 4 days, the tropical cyclone tracked west-northwestward, straight towards Guam, then on 4 September took a sudden, unanticipated turn to the north-northwest and headed for the Northern Marianas and Japan.

II. TRACK AND INTENSITY

Ivy developed in a broad monsoon trough near Kosrae in the eastern Caroline Islands. It was first mentioned on the 010600Z September Significant Tropical Weather Advisory when a consolidated area of convection started to flare up along the trough. As the convection became more organized, a Tropical Cyclone Formation Alert was issued at 020200Z, followed by a warning at 021200Z. Initially, Ivy was difficult to locate precisely as it developed a broad, glaciated central dense overcast. On 4 September, a southwesterly monsoon surge linked up with the cyclone, adding even more diffuse cloudiness (Figure 3-17-1). The surge then sharply pushed the tropical cyclone to the north-northwest, against the western periphery of the subtropical ridge. As Ivy moved northward, it began to rapidly

Figure 3-17-1. Satellite imagery depicts the southwest monsoon cloudiness approaching Ivy while the tropical storm tracks west-northwestward (041214Z September DMSP infrared imagery).

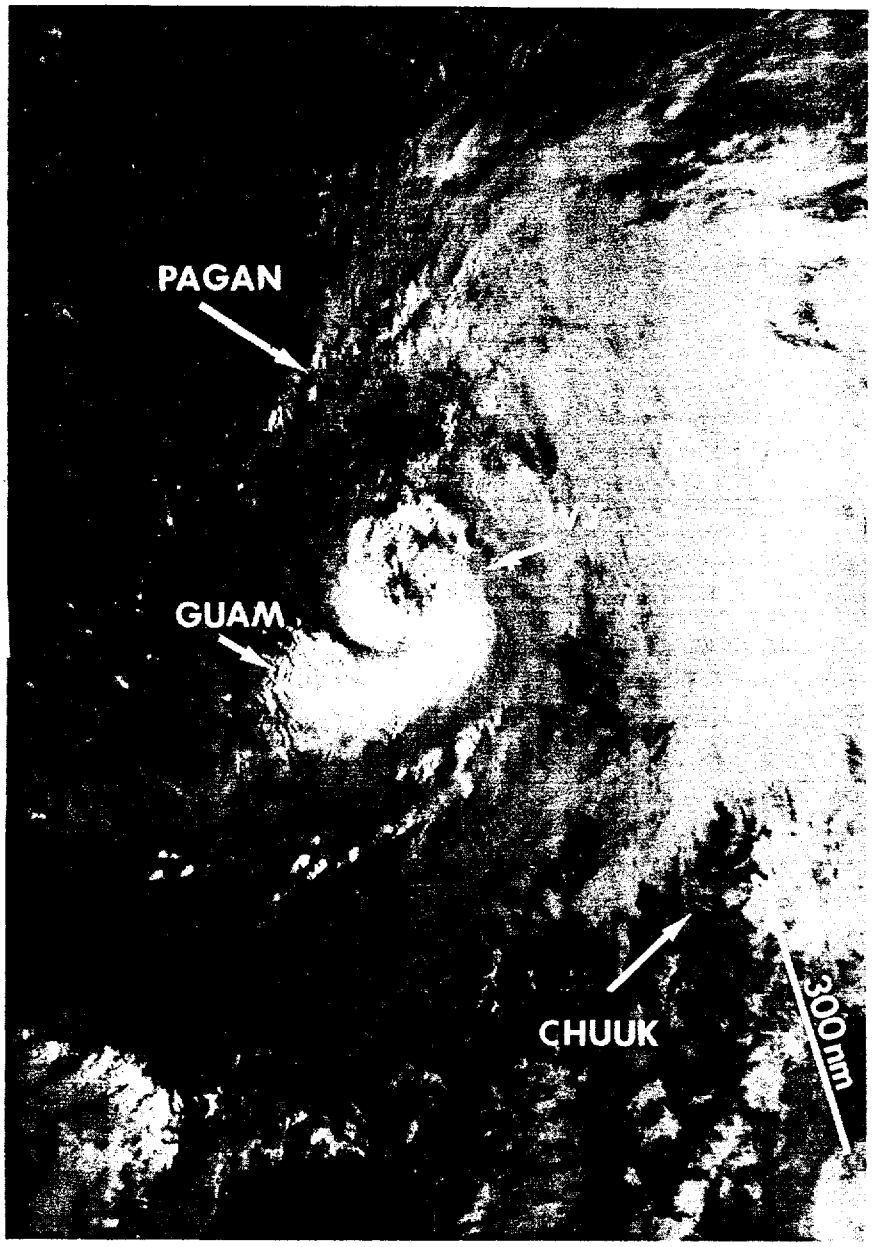

Figure 3-17-2. Satellite imagery 10 hours after Figure 3-17-1 shows Ivy as it reaches typhoon intensity (042242Z September DMSP visual imagery).

intensify, and by 050000Z had formed an eye (Figure 3-17-2). At that time, it was upgraded to typhoon intensity as it passed 130 nm (240 km) east of the islands of Tinian and Saipan in the Commonwealth of the Northern Marianas. The typhoon continued to track north-northwestward towards the axis of the subtropical ridge, and steadily intensified. During 7 September, Typhoon Ivy reached its maximum intensity of 115 kt (59 m/sec), then began to slow down as it made the turn around the ridge axis. Although the vertical shear increased, Ivy entrained most of its inflow from the warm, moist tropical air along its southeastern side. This factor, and its path right on top of the Kuroshio Current, resulted in a more gradual than normal decrease in intensity as the tropical cyclone accelerated south of Japan and transitioned to an extratropical low 600 nm (1110 km) east of Tokyo. The final warning was issued at 100600Z.

III. FORECAST PERFORMANCE

Initially, Ivy was on a westward course, then turned abruptly towards the north-northwest as it intensified. Before this turn, all JTWC forecasts reflected a west-northwest track under the subtropical ridge (Figure 3-17-3). On 3 September forecaster confidence was high that the ridge to the north of Ivy would hold and the track would be near Guam. Guam and Rota went into Condition of Readiness 2, as Ivy moved closer to the islands, and JTWC expected the system to reach typhoon intensity as it hit. The dynamic guidance was in agreement with the west-northwest track until the NOGAPS prognostic

series at 040000Z. Then, the NOGAPS model indicated a rapid breakdown of the ridge, possibly in response to the southwesterly monsoon surge. Satellite data indicated that the tropical cyclone had turned, but an early radar fix still suggested west-northwestward motion. Once it was determined by subsequent radar information that Ivy was, in fact, moving away from the area, JTWC recommended that Tinian and Saipan increase their condition of readiness from 3 to 2. The Center then adopted a north-northwestward track that verified well as the system moved northward towards Japan.

The intensity forecasts for Ivy's early stages were initially too high due to a slower than normal rate of intensification. The forecast intensities verified well as the system recurved south of Japan.

IV. IMPACT

Rough seas churned up by Ivy's passage were responsible for one drowning on the island of Saipan. While Typhoon Ivy passed just to the east of Pagan (WMO 91222)(Figure 3-17-4) and Agrihan Islands in the Northern Marianas, no injuries and only minor damage were reported by the 13 residents of Agrihan. As Ivy paralleled the southern coast of Honshu, one fisherman was killed and four others were reported missing. Later, as the typhoon passed the southeastern tip of Honshu, Tokyo and the surrounding areas experienced high winds and heavy rains which disrupted ground and air transportation and left four people injured. Additional reports of damage in Japan included over 200 landslides and 733 flooded homes.

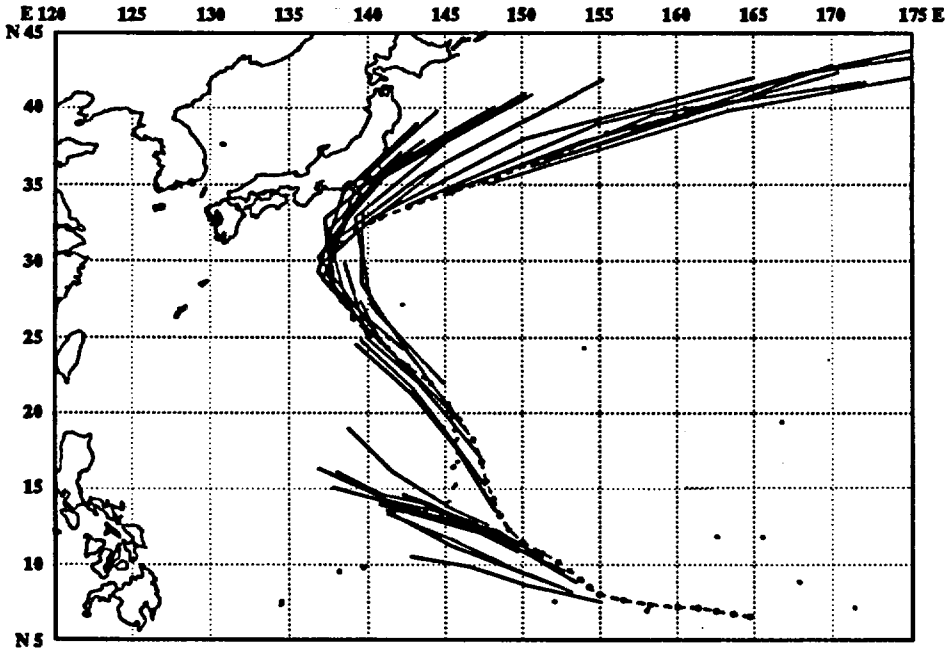

Figure 3-17-3. A comparison of JTWC official forecast positions with Ivy's verifying final best track positions.

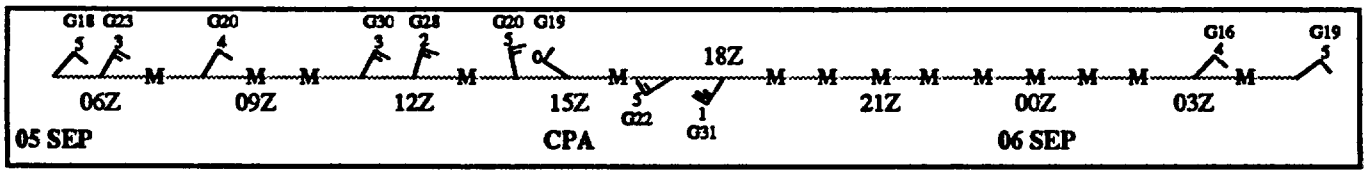

Figure 3-17-4. Intermittent wind reports from the Pagan Island (WMO 91222) Automatic Meteorological Observing Station reflect Ivy's passage to the east. The closest point of approach (CPA), 45 nm (85 km), occurred on 5 September.